Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. For use in an electron microscope, a waveguide comprising:
   a) a first end adapted for coupling to a detector;
   b) a second end having angled sides, said second end having a beveled hole for passing an electron beam of said electron microscope therethrough, said angled sides having a first reflective coating, said beveled hole having an inner surface with a second reflective coating disposed thereon; and
   c) a phosphor coating disposed on said second end around a narrower opening to an approximate diameter of a wide opening of said beveled hole.

2. A waveguide as claimed in claim 1 wherein said waveguide comprises optical material having a refractive index of approximately 1.5.

3. A waveguide as claimed in claim 1 wherein said first end is flared.

4. A waveguide as claimed in claim 3 wherein said first end is manufactured as a first piece and said second end is manufactured as a second piece, and said first and said second pieces are joined at an interface having minimal reflective losses.

5. A waveguide as claimed in claim 1 wherein said angled sides form an angle of substantially 90°.

6. A waveguide as claimed in claim 1 wherein said beveled hole has bevel angle of substantially 45°.

7. A waveguide as claimed in claim 1 wherein said first and said second reflective coatings are selected from the group consisting of aluminum and silver.

8. A waveguide as claimed in claim 1 wherein said waveguide has approximate dimensions of 22 to 24 mm in length, 6 mm in width, and 1.5 to 3.6 mm in thickness.

9. A waveguide a claimed in claim 1 wherein said first end of said waveguide is dimensioned to fit within a microcolumn of said electron microscope.

10. A waveguide as claimed in claim 1 further comprising a cylindrical light guide, said light guide being disposed between said waveguide and a photomultiplier, said light guide having

a) an angled face, said angled face having an angle of 45° to the longitudinal axis of said light guide, said angled face further having a third reflective coating,

b) a notch for mating with said first end of said waveguide, and

c) a plurality of sleeves having a inner surface for optically coupling said optical cylinders, said inner surface having a fourth reflective coating deposed thereon.

11. A waveguide as claimed in claim 10 wherein said third and said fourth reflective coatings are selected from the group consisting of aluminum and silver.

12. A waveguide as claimed in claim 10 wherein said cylindrical light guide is comprised of a plurality of optical cylinders.

13. A waveguide as claimed in claim 1 wherein said detector is a photomultiplier.